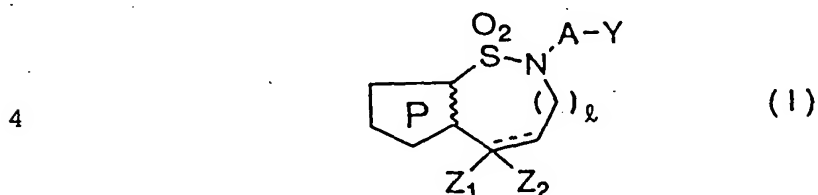


# CLAIMS

1           1. A pyrrolesulfonamide derivative or a salt  
2 thereof, said pyrrolesulfonamide derivative being  
3 represented by the following formula (I):

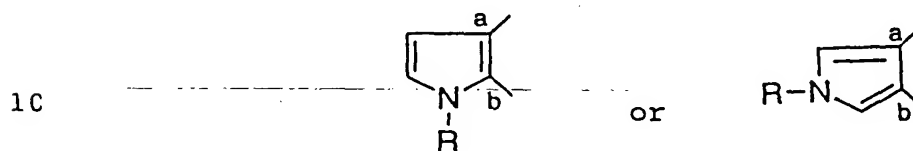


5 wherein

6 the ring P represented by



8 means a pyrrole ring represented by the following  
9 structure:



11 in which R represents an alkyl group, a cycloalkyl  
12 group, a cycloalkyl-alkyl group or a substituted or un-  
13 substituted aralkyl group;

14 the dashed line indicates the presence or absence  
15 of a bond; and, when the bond indicated by the dashed  
16 line is present, Z<sub>2</sub> is not present and Z<sub>1</sub> represents a

17 hydrogen atom but, when the bond indicated by the  
 18 dashed line is absent,  $Z_1$  represents a hydrogen atom  
 19 and  $Z_2$  represents a hydroxyl group; or  $Z_1$  and  $Z_2$  are  
 20 combined together to represent an oxygen atom or a  
 21 group  $NOR_1$  in which  $R_1$  represents a hydrogen atom, a  
 22 substituted or unsubstituted alkyl group, a substituted  
 23 or unsubstituted aralkyl group or a substituted or un-  
 24 substituted aryl group;

25  $l$  represents 0 or 1;

26 ~~A represents a substituted or unsubstituted~~ ---  
 27 alkylene group, a substituted or unsubstituted  
 28 alkenylene group or a substituted or unsubstituted  
 29 alkynylene group; and

30 Y represents a group



32 in which W represents CH, C= or a nitrogen atom; and,  
 33 when W represents CH, m stands for 0 or 1, B represents  
 34 a carbonyl group, a sulfonyl group, an alkylene group,  
 35 an alkenylene group, a group  $-C(OH)R_2-$  in which  $R_2$   
 36 represents a substituted or unsubstituted aryl group, a  
 37 group  $-CHR_3-$  in which  $R_3$  represents a substituted or  
 38 unsubstituted aryl group, or a substituted or un-

39 substituted cyclic or acyclic acetal group; when W  
40 represents C=, m stands for 1, B represents a group



42 in which the double bond is coupled with W and R<sub>4</sub>  
43 represents a substituted or unsubstituted aryl group or  
44 a substituted or unsubstituted aralkyl group; when W  
45 represents a nitrogen atom, m stands for 0 or 1, and B  
46 represents a carbonyl group, a sulfonyl group, an  
47 alkylene group, an alkenylene group or a group -CHR<sub>5</sub>-  
48 in which R<sub>5</sub> represents a substituted or unsubstituted  
49 aryl group; E<sub>1</sub> and E<sub>2</sub> each independently represents a  
50 hydrogen atom or a lower alkyl group; and D represents  
51 a substituted or unsubstituted aromatic hydrocarbon  
52 group or a substituted or unsubstituted aromatic  
53 heterocyclic group.

1 2. A pyrrolesulfonamide derivative or a salt  
2 thereof according to claim 1, wherein in the formula  
3 (I), Z<sub>1</sub> represents a hydrogen atom and Z<sub>2</sub> represents a  
4 hydroxyl group.

1 3. A pyrrolesulfonamide derivative or a salt  
2 thereof according to claim 1, wherein in the formula  
3 (I), Z<sub>1</sub> and Z<sub>2</sub> are combined together to represent an  
4 oxygen atom or a group NOH.

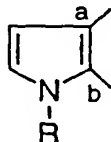
1 4. A pyrrolesulfonamide derivative or a salt

2 thereof according to claim 1, 2 or 3, wherein in the  
3 formula (I), A is a trimethylene group.

1 5. A pyrrolesulfonamide derivative or a salt  
2 thereof according to claim 1, 2, 3 or 4, wherein in the  
3 formula (I), W represents a nitrogen atom, m stands for  
4 0, and D represents a substituted or unsubstituted  
5 phenyl group.

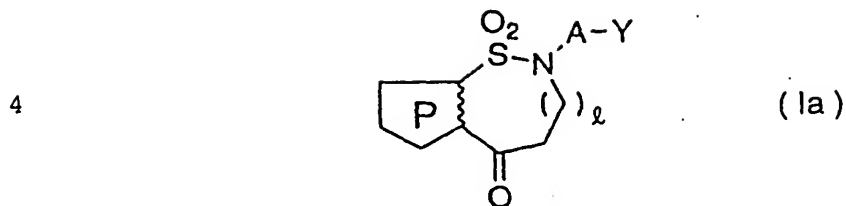
1 6. A pyrrolesulfonamide derivative or a salt  
2 thereof according to claim 1, 2, 3, 4 or 5, wherein in  
3 the formula (I), E<sub>1</sub> and E<sub>2</sub> both represent hydrogen  
4 atoms.

1 7. A pyrrolesulfonamide derivative or a salt  
2 thereof according to claim 1, 2, 3, 4, 5 or 6, wherein  
3 in the formula (I), the ring P represents the following  
4 formula:



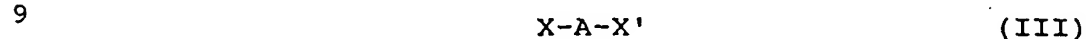
6 wherein R has the same meaning as defined above.

1 8. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (Ia):

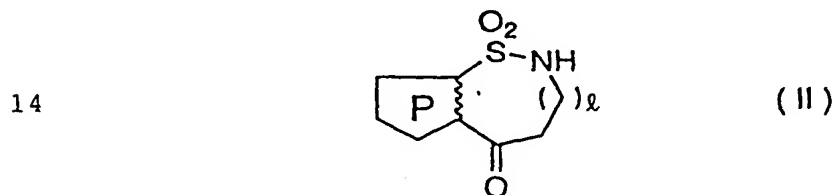


5 wherein A, the ring P, Y and *l* have the same meanings  
6 as defined above, which comprises:

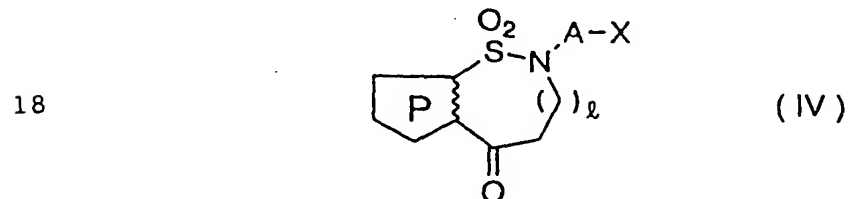
7 reacting a compound, which is represented by the  
8 following formula (III):



10 wherein A has the same meaning as defined above and X  
11 and X' represent the same or different eliminative  
12 groups, to a compound represented by the following for-  
13 mula (II):



15 wherein the ring P and *l* have the same meanings as  
16 defined above, thereby obtaining a compound represented  
17 by the following formula (IV):



19 wherein A, the ring P, X and *l* have the same meanings

20 as defined above; and then

21 reacting a nitrogen-containing compound

22 represented by the following formula (V):

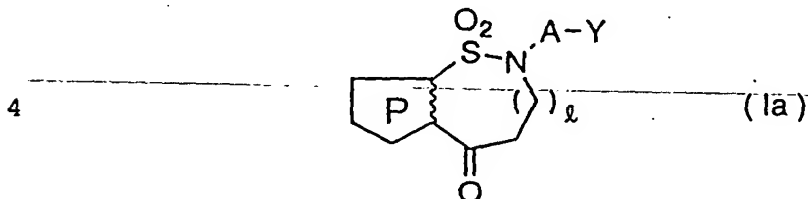
23 
$$\text{H-Y} \quad (\text{V})$$

24 wherein Y has the same meaning as defined above.

1 9. A process for the preparation of a pyrrole-

2 sulfonamide derivative represented by the following

3 formula (Ia):



5 wherein A, the ring P, Y and l have the same meanings

6 as defined above, which comprises:

7 reacting a compound, which is represented by the

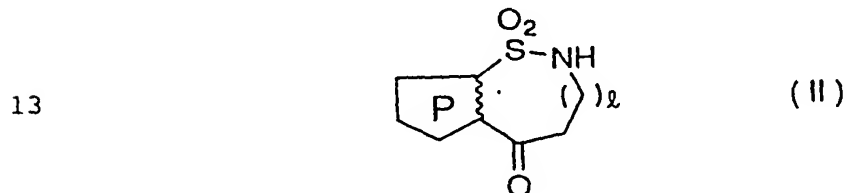
8 following formula (VI):

9 
$$\text{X-A-Y} \quad (\text{VI})$$

10 wherein A, X and Y have the same meanings as defined

11 above, to a compound represented by the following for-

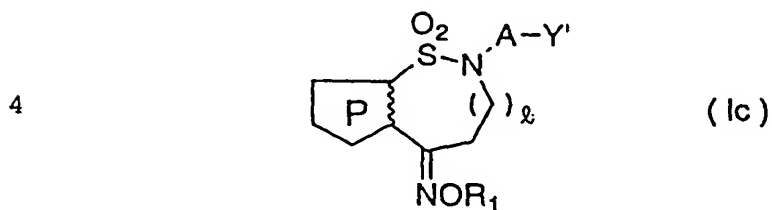
12 mula (II):



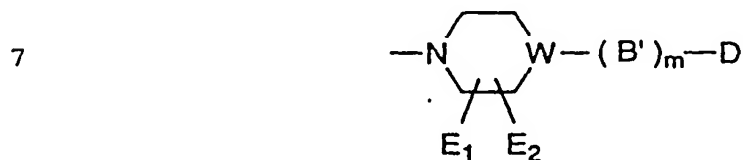
14 wherein the ring P and l have the same meanings as

15 defined above.

1 10. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (Ic):



5 wherein A, the ring P, R<sub>1</sub> and l have the same meanings  
6 as defined above, and Y' represents a group



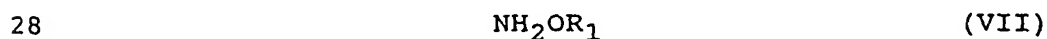
8 in which when W represents CH, B' represents a sulfonyl  
9 group, an alkylene group, an alkenylene group, a group  
10 -C(OH)R<sub>2</sub>- in which R<sub>2</sub> represents a substituted or un-  
11 substituted aryl group, a group -CHR<sub>3</sub>- in which R<sub>3</sub>  
12 represents a substituted or unsubstituted aryl group,  
13 or a substituted or unsubstituted cyclic or acyclic  
14 acetal group; when W represents C=, B' represents a  
15 group



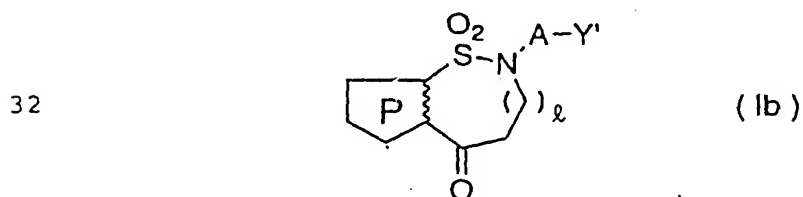
17 in which the double bond is coupled with W and R<sub>4</sub>

18 represents a substituted or unsubstituted aryl group or  
 19 a substituted or unsubstituted aralkyl group; when W  
 20 represents a nitrogen atom, B' represents a carbonyl  
 21 group, a sulfonyl group, an alkylene group, an  
 22 alkenylene group or a group  $-CHR_5-$  in which  $R_5$   
 23 represents a substituted or unsubstituted aryl group;  
 24 and D,  $E_1$ ,  $E_2$  and m have the same meanings as defined  
 25 above, which comprises:

26 reacting a hydroxylamine or a derivative thereof,  
 27 which is represented by the following formula (VII):



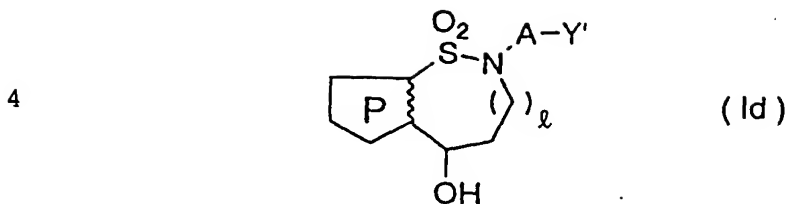
29 wherein  $R_1$  has the same meaning as defined above, with  
 30 a pyrrolesulfonamide derivative represented by the fol-  
 31 lowing formula (Ib):



33 wherein A, the ring P,  $Y'$  and  $l$  have the same meanings  
 34 as defined above.

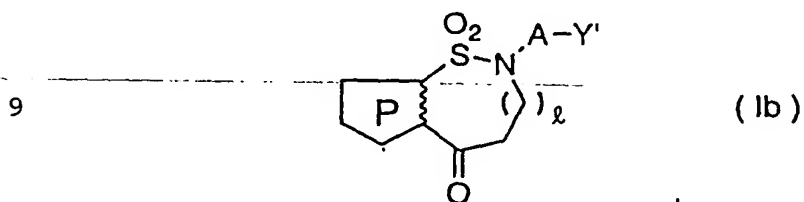
1 11. A process for the preparation of a pyrrole-  
 2 sulfonamide derivative represented by the following  
 3 formula (Id):





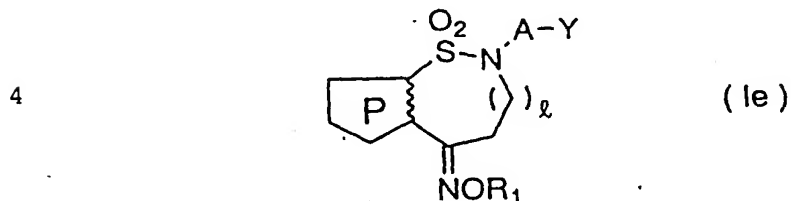
5 wherein A, the ring P, Y' and  $\ell$  have the same meanings  
6 as defined above, which comprises:

7 reducing a pyrrolesulfonamide derivative  
8 represented by the following formula (Ib):



10 wherein A, the ring P, Y' and  $\ell$  have the same meanings  
11 as defined above.

1 12. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (Ie):

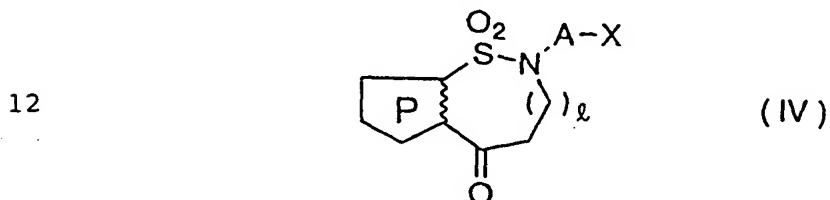


5 wherein A, the ring P, R<sub>1</sub>, Y and  $\ell$  have the same mean-  
6 ings as defined above, which comprises:

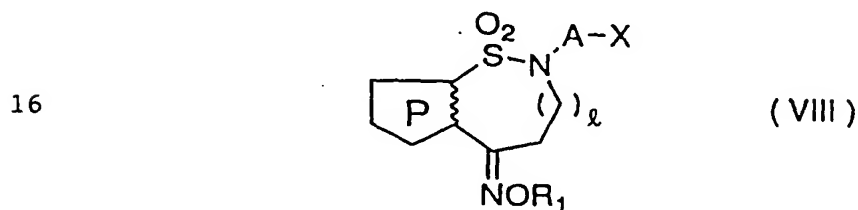
7 reacting a hydroxylamine or a derivative thereof,  
8 which is represented by the following formula (VII):

9  $\text{NH}_2\text{OR}_1$  (VII)

10 wherein  $\text{R}_1$  has the same meaning as defined above, to a  
11 compound represented by the following formula (IV):



13 wherein A, the ring P, X and  $\ell$  have the same meanings  
14 as defined above, thereby obtaining a compound  
15 represented by the following formula (VIII):



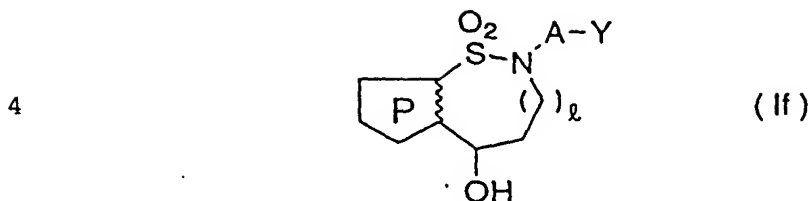
17 wherein A, the ring P,  $\text{R}_1$ , X and  $\ell$  have the same mean-  
18 ings as defined above; and then

19 reacting a nitrogen-containing compound  
20 represented by the following formula (V):

21  $\text{H-Y}$  (V)

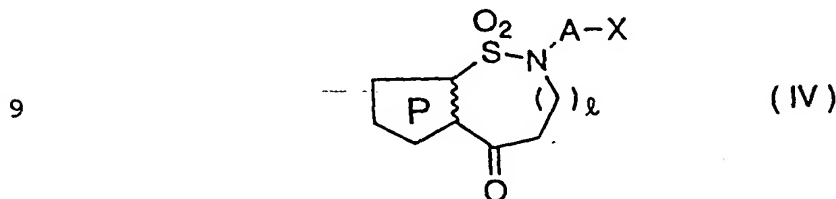
22 wherein Y has the same meaning as defined above.

1 13. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (If):

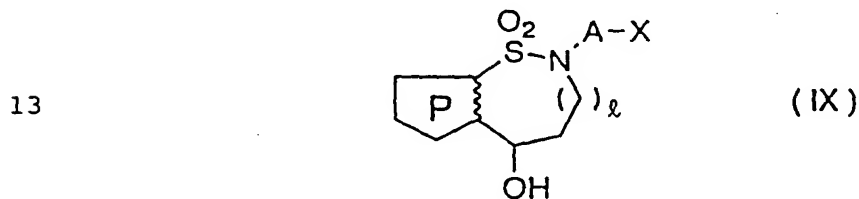


5 wherein A, the ring P, Y and  $l$  have the same meanings  
6 as defined above, which comprises:

7 reducing a compound represented by the following  
8 formula (IV):

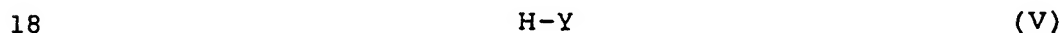


10 wherein A, the ring P, X and  $l$  have the same meanings  
11 as defined above, thereby obtaining a compound  
12 represented by the following formula (IX):



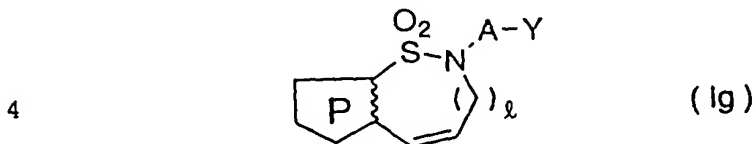
14 wherein A, the ring P, X and  $l$  have the same meanings  
15 as defined above; and then

16 reacting a nitrogen-containing compound  
17 represented by the following formula (V):



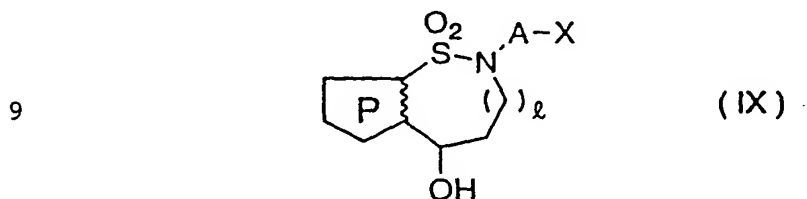
19 wherein Y has the same meaning as defined above.

1           14. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (Ig):

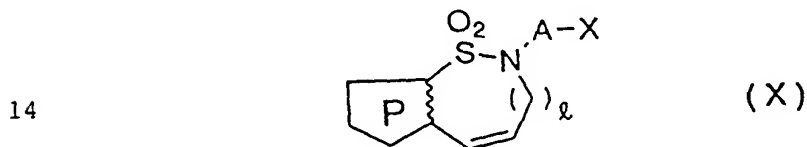


5 wherein A, the ring P, Y and  $\ell$  have the same meanings  
6 as defined above, which comprises:

7 ~~subjecting a compound,~~ which is represented by  
8 the following formula (IX):



10 wherein A, the ring P, X and  $\ell$  have the same meanings  
11 as defined above, to dehydration treatment, thereby ob-  
12 taining a compound represented by the following formula  
13 (X):



15 wherein A, the ring P, X and  $\ell$  have the same meanings

16 as defined above; and then

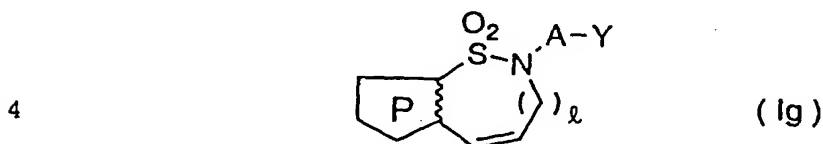
17 reacting a nitrogen-containing compound

18 represented by the following formula (V):

19 
$$\text{H-Y} \quad \quad \quad (\text{V})$$

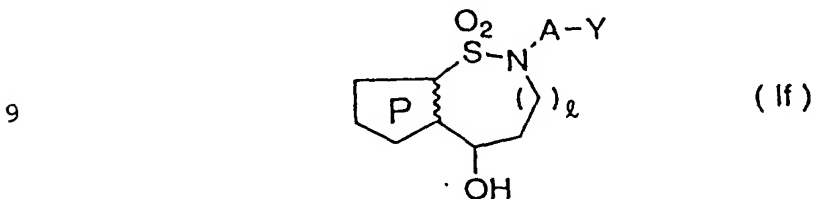
20 wherein Y has the same meaning as defined above.

1 15. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (Ig):



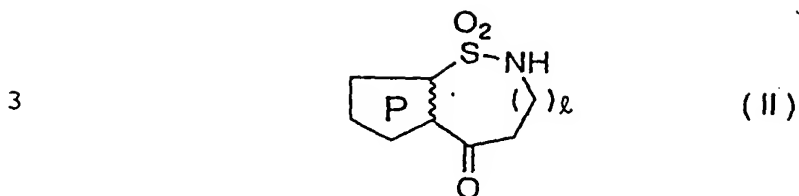
5 wherein A, the ring P, Y and l have the same meanings  
6 as defined above, which comprises:

7 subjecting a compound, which is represented by  
8 the following formula (If):



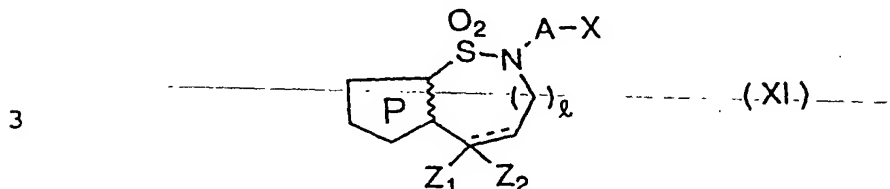
10 wherein A, the ring P, Y and l have the same meanings  
11 as defined above, to dehydration treatment.

1 16. A compound represented by the following for-  
2 mula (II):



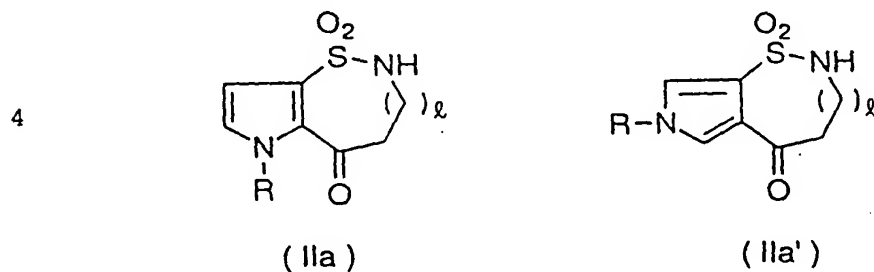
4 wherein the ring P and  $l$  have the same meanings as  
5 defined above.

1 17. A compound represented by the following for-  
2 mula (XI):



4 wherein the dashed line, A, the ring P, X,  $Z_1$ ,  $Z_2$  and  
5  $l$  have the same meanings as defined above.

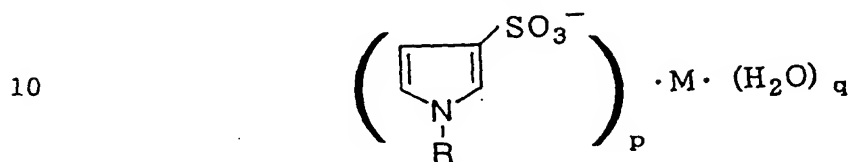
1 18. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (IIa) or (IIa'):



5 wherein R and  $l$  have the same meanings as defined  
6 above, which comprises:

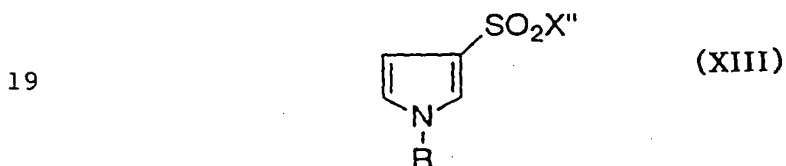
7 converting a 1-substituted-pyrrole-3-sulfonic

8 acid or a salt thereof, which is represented by the  
9 following formula (XII):



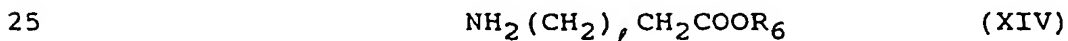
(XII)

11 wherein M represents a hydrogen ion, an alkali metal  
12 ion, an alkaline earth metal ion or a quaternary am-  
13 monium ion, p stands for 1 when M represents a hydrogen  
14 ion, an alkali metal ion or a quaternary ammonium ion  
15 or p stands for 2 when M represents an alkaline earth  
16 metal ion, q stands for 0 or 1, and R has the same  
17 meaning as defined above, into a compound represented  
18 by the following formula (XIII):



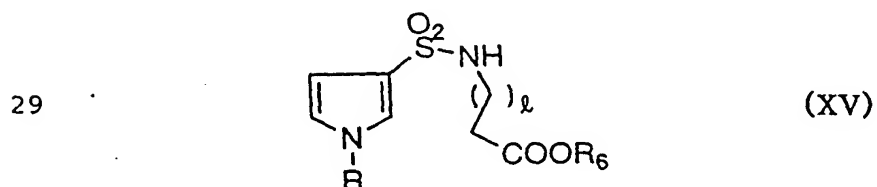
20 wherein X'' represents a chlorine atom or a bromine  
21 atom;

22 causing glycine or  $\beta$ -alanine or a derivative  
23 thereof, which is represented by the following formula  
24 (XIV):



26 wherein R<sub>6</sub> represents a hydrogen atom or a carboxyl-

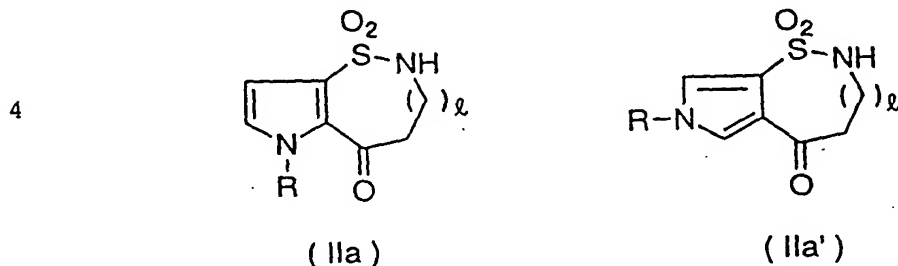
27 protecting group, to act, thereby obtaining a compound  
28 represented by the following formula (XV):



30 wherein R, R<sub>6</sub> and l have the same meanings as defined  
31 above; and then

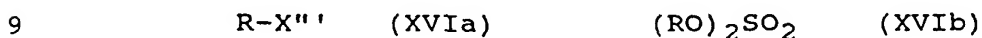
32 subjecting said compound to ring closure.

1 19. A process for the preparation of a pyrrole-  
2 sulfonamide derivative represented by the following  
3 formula (IIa) or (IIa'):



5 wherein R and l have the same meanings as defined  
6 above, which comprises:

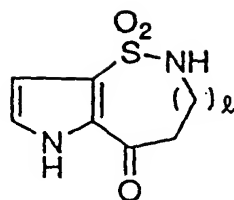
7 reacting a compound, which is represented by the  
8 formula (XVIa) or (XVIb):



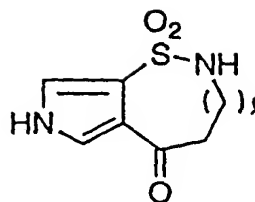
10 wherein X''' represents an eliminative group and R has  
11 the same meaning as defined above, with a compound  
12 represented by the following formula (IIb) or (IIb'):



13



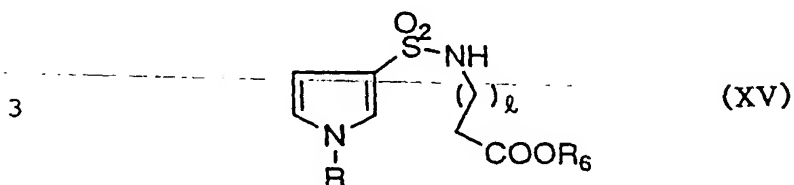
(IIb)



(IIb')

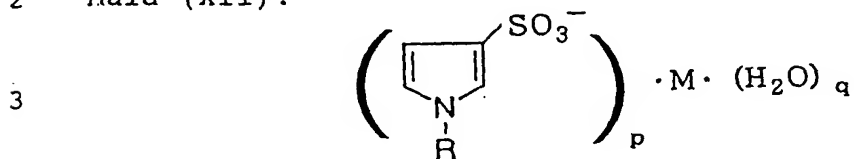
14 wherein  $l$  has the same meaning as defined above.

1 20. A compound represented by the following for-  
2 mula (XV):



4 wherein R,  $R_6$  and  $l$  have the same meanings as defined  
5 above.

1 21. A compound represented by the following for-  
2 mula (XII):

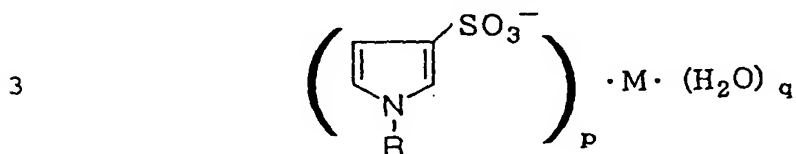


4 wherein M, R, p and q have the same meanings as defined  
5 above.

1 22. A compound according to claim 21, wherein in  
2 the formula (XII), R is a methyl group, M is a sodium  
3 ion, p is 1, and q is 0 or 1.

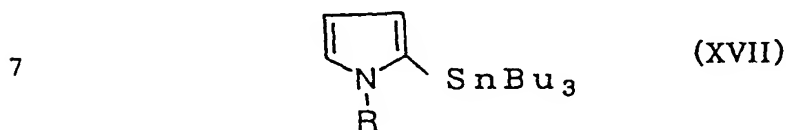
1        23. A process for the preparation of a  
2 1-substituted-pyrrole-3-sulfonic acid or a salt there-  
3 of, which comprises treating a 1-substituted-pyrrole  
4 with sulfur trioxide-pyridine complex.

1        24. A process for the preparation of a compound  
2 represented by the following formula (XII):



(XII)

4 wherein M, R, p and q have the same meanings as defined  
5 above, which comprises treating a compound, which is  
6 represented by the following formula (XVII):



8 wherein R has the same meaning as defined above, with  
9 trimethylsilyl chlorosulfonate, followed by alkali  
10 hydrolysis.

1        25. A pharmaceutical comprising, as an effective  
2 ingredient, a pyrrolesulfonamide derivative or a salt  
3 thereof according to claim 1.

1        26. A therapeutic for circulatory diseases, com-  
2 prising as an effective ingredient a pyrrolesulfonamide  
3 derivative or a salt thereof according to claim 1.

- 1           27. A serotonin-2 receptor antagonist, comprising
- 2   as an effective ingredient a pyrrolesulfonamide deriva-
- 3   tive or a salt thereof according to claim 1.